

High-tech in an O-ring

Why my battery kits do not include silicone grease

Battery, seal - everything is there. Except for the little sachet of silicone grease. Forgotten?

No. It is deliberately left out. An O-ring that is simply compressed in its groove when the compartment is closed does not need grease for that process. The ring itself does the sealing.

That unassuming little component has more going for it than you might think.

What exactly is silicone grease?

Silicone grease typically consists of silicone oil and a thickener, often silica. The thickener turns the flowing oil into a paste.

It has little in common with a fat in the chemical sense. In lubrication terminology, however, the mixture can still be called grease. Since everyone calls it silicone grease, and we are not here to split hairs, we will stick with that name.

The more interesting question is: does our O-ring actually need it?

Not all rubber is the same

The O-rings in my battery kits are made from high-quality materials selected for their intended use, such as NBR or EPDM.

These are elastomers - materials we usually just call rubber. But not all rubber is the same. Material, hardness and dimensions must all be right. Black, round and roughly the right size is not enough.

A ring with clearly defined dimensions

An O-ring is specified by its inside diameter and cord diameter. For example, an O-ring measuring 4.5×0.6 mm has an inside diameter of 4.5 mm and a cord diameter of 0.6 mm.

Imagine cutting through a normal O-ring: you see a circle. The profile means this cross-section, rather than the shape of the complete ring.

Only a few dive computers require a flat gasket instead. Its cross-section is rectangular. It too needs a seat that matches its geometry.

1 · O-ring

Inside diameter × cord diameter: 4.5 × 0.6 mm



Inside diameter
Top view

Ring with a segment removed



Ø 0.6 mm
Circular cut face
Cord diameter and cross-section
The cut faces show the circular profile

2 · Flat gasket

Rectangular cross-section

Gasket with a segment removed



Rectangular cut face
Flat gasket in section
Rectangular profile

Schematic illustration · Views are not at the same scale

Figures 1 and 2: Ring dimensions and cross-sections. The cutaway rings show the circular and rectangular sections. Schematic, not to scale.

How an O-ring seals

In the arrangement described here, the O-ring sits in a groove between the housing and the cover. Closing the compartment compresses it.

The material does not simply disappear. It spreads sideways, changes its cross-section and uses the space provided in the groove. This elastic deformation allows the ring to conform to the sealing surfaces and accommodate tiny surface irregularities. That closes the path for water.

Two arrangements in cross-section

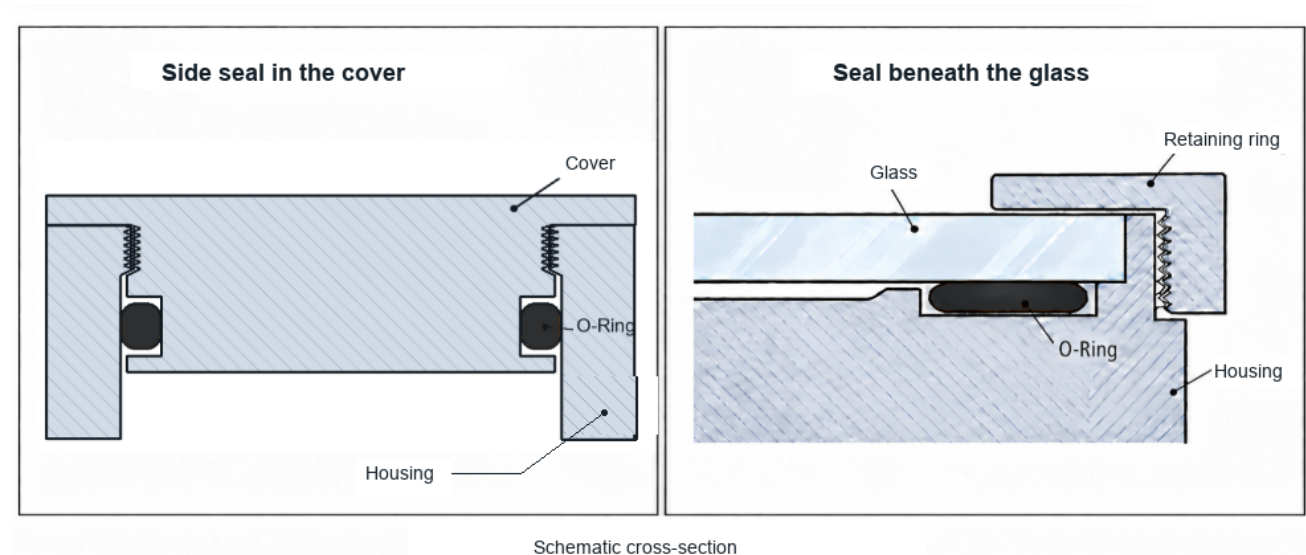


Figure 3: On the left, the O-ring sits in a side groove in the cover and is compressed against the housing wall. On the right, the seal sits in a housing groove beneath the glass, which is held by a threaded retaining ring. Schematic cross-section.

With the side seal in the cover, the O-ring slides along the housing wall during installation. A suitable low-friction coating or assembly aid can reduce friction here.

The word tiny deserves attention. A hair, a grain of sand or a damaged sealing seat is not a normal surface irregularity. An O-ring is a precision component, not repair putty with a hole in the middle.

No sliding? No grease needed.

If closing the compartment simply compresses the O-ring, no lubrication is needed for that process. Silicone grease, graphite and talc do not do the sealing; they just make sliding easier.

That is the key distinction: Compression seals. Lubrication helps sliding.

That is why I do not include silicone grease as a universal extra in my battery kits. The mere presence of a seal is no reason to reach for the grease tube. An O-ring is not a slice of toast.

More grease can mean more dirt

Excess grease is good at collecting things that have no place on a sealing surface: dust, fibres and sand.

More grease certainly does not mean more safety. A speck of dirt in the wrong place can turn a dry battery compartment into a rather expensive aquarium.

Clean sealing surfaces and a correctly seated O-ring are what matter. A coating of grease cannot replace either.

Can an O-ring swell?

Yes, if the material is incompatible with the oil or grease used.

This is not simply a question of quality. Even a high-quality seal can swell in an unsuitable medium. Its dimensions, and possibly its mechanical properties, then change. In the worst case, the swollen O-ring can jam the closure so tightly that the dive computer can no longer be opened.

The NBR and EPDM materials I use are generally compatible with common silicone oils and greases. That does not mean that every lubricant is automatically suitable.

For compression alone, the answer is straightforward: where grease is not needed, there is no reason to add it.

Some rings already have a thin coating

Some of my battery kits contain graphite-coated O-rings. The coating can be recognised by their silvery sheen. Others have a light talc coating and look more grey or matt.

These thin coatings make sliding easier where it is required during installation. The elastic ring still does the actual sealing.

Baby powder often contains talc, a chemically largely inert mineral. That means it hardly reacts with other substances under normal conditions, while helping surfaces slide more easily.

With powder too, use very little. Thick layers or accumulations of powder do not belong between sealing surfaces. A ring that is already coated does not need extra powder as a precaution.

A calm battery change beats a tropical adventure

For dive computers designed to allow the user to replace the battery, the job is usually straightforward. It still calls for a little care.

Choose a clean, dry and quiet workspace. The outside of the housing should be dry before you open it. Check the groove, the sealing surfaces and the new ring, and make sure it is correctly seated when you close the compartment.

The air in the room plays a part too: closing the compartment traps some of that air inside, along with its moisture.

Normal indoor air is usually unproblematic. Very warm, humid air can encourage condensation when it cools later. The water was already inside as invisible water vapour.

Direct sunlight is not an ideal workspace either. When trapped warm air cools later, its pressure drops slightly. The effect is small compared with the water pressure during a dive, but it is avoidable. A dry desk at a comfortable temperature beats a steaming boat bench.

Small seal, big responsibility

The right material, the right dimensions, clean sealing surfaces and careful installation: that is what counts.

An O-ring that is simply compressed does not need grease. If it has to slide, a suitable assembly aid can help. It is worth keeping those two situations separate.

So there is no forgotten grease sachet in my battery kits. It has deliberately been left out.

No seal is as expensive as the failure it prevents.

That little ring deserves attention. It does not need a generous helping of grease.